REMARKS

Claims 1-18, as amended, and new claims 19-20 now appear in this application for the Examiner's review and consideration. Claim 1 was amended to include some of the features of claims 2 and 8, while the dependencies of claims 3 and 17 were amended for consistency with the other claims. Claims 8, 9, 11, 12 and 13 were also amended to be consistent with amended claims 1 and to correct an informality that was noted by the Examiner. New claim 19 is directed to the use of certain surfactants as set forth on pages 11 and 12 of the application. New claim 20 is directed to the use of different plates for polishing and for rinsing/cleaning, as supported by page 22 of the application. As none of these changes introduce new matter, all changes and additions should be entered at this time.

Claims 11 and 12 were rejected for lack of antecedent basis for the term "surfactant solution." In response, these claims were amended as noted above to correct this informality.

Applicants confirm that the Examiner's presumption that the invention that is covered by the claims was commonly owned is correct.

Before addressing the prior art rejections, a brief review of the present invention should be helpful. The present invention relates to a method for preparing surfaces of semiconductors by using a polishing solution and a rinsing solution. The particularity of the invention is that a rinsing solution that includes an acidic component is applied to stop and neutralize the chemical attack effected by the chemical component of a polishing solution which has a neutral and preferably a basic pH.

Claims 1-6 and 14-18 were rejected as being anticipated by US patent 6,638,145 to Hall et al. ("Hall"). As noted in the background section of the present application, Hall describes a process using a polishing slurry comprising an abrasive frictional component and a chemical component. These two solutions have a high pH and this pH is decreased by rinsing with deionized water.

Accordingly, there can be no anticipation of claim 1 since the chemical attack of the wafer surface due to polishing with a neutral or basic pH solution is **not** controllably stopped by progressively introducing a rinsing solution that includes an acidic component. Instead, Hall discloses rinsing with deionized water which by itself would have a pH of around 6 but which does not contain that includes an acidic component. Despite acknowledging that the polishing should be conducted at a high pH, and that the rinsing should be conducted at a low pH, Hall fails to mention any particular pH for rinsing with other than the pH of deionized water, which is approximately 6. He also does not mention the incorporation of an acidic component in the rinsing solution. This does not meet what is claimed by applicants.

Also, the present invention utilizes a polishing solution that has a neutral of basic pH and that contains solid particles and a chemical agent, followed by rinsing with a rinsing solution that includes an acidic component which is progressively introduced onto the wafer surface to lead to a progressive decrease of the pH, down to an acidic value (see par. 59) to precisely stop the planarization effect. Hall does not disclose stopping the chemical attack of

the wafer surface by progressively introducing a rinsing solution that includes an acidic component. Thus, the anticipation rejection is overcome and should be withdrawn.

Claims 7-13 were rejected as being unpatentable over Hall. As noted above, claim 1 recites that the polishing is conducted with a neutral or basic pH solution and the chemical attack of the wafer surface is controllably stopped by progressively introducing a rinsing solution that includes an acidic component. Hall has absolutely no disclosure of the use of an acidic rinsing solution, nor does he teach the benefits in controlling the extent of planarization of the wafer by stopping the chemical reaction through the progressive administration of the rinsing solution. Hall also fails to disclose the benefits obtained by such process, namely that the introduction of the acidic component, e.g., an acidic surfactant, promotes rapid termination of the chemical action of the polishing solution. The acidic component can also be used to terminate the polishing entirely because the chemical action dominates over the mechanical action when semiconductor surfaces such as silicon are being polished. Another advantage of the use of a rinsing solution that includes an acidic component is that post processing thickness is more readily guaranteed and reproduced because in addition to the direct means that are available to control polishing, indirect means for terminating the polishing action are exerted. The result is that control of planarization on the order of nanometers is readily achieved.

Furthermore, Hall teaches away from the use of acidic solutions or solutions having lower pHs. Hall in the background explains that a lower pH is not desired because if silica particles are used it induces a higher defectivity environment (col.2, line 54-58). Hall's Fig. 4 shows that the pH is around 11 during all the process or around 6 during the cleaning step. He simply emphasizes that there be a difference between the polishing step and the cleaning step. In addition, the prior art in Hall does not mention lower pH rinsing solutions because a skilled artisan would know and believe that not the use of an acidic rinsing solution would lead to slurry abrasive agglomerates (See col.2, lines 53-61 of Hall).

In view of the above, the obviousness rejection based on Hall has been overcome and should be withdrawn.

Claims 11-13 were rejected as being unpatentable over the combination of Hall with US patent 5,958,298 to Nagoshi et al. ("Nagoshi") for the reasons set forth in the office action. Applicants traverse the rejection.

Nagoshi discloses the use of polyoxyalkylene alkyl ethers in a rinsing process as an essential component (col. 2, line 57 and claim 1) to clean electronic parts (col.1, line 9 and col.2, line 8). However, Nagoshi disclose the use of this surfactant for **cleaning** while the invention discloses the use of this type of surfactant during **polishing** for controlling the stop of the chemical attack. But Nagoshi does not teach that the rinsing step should be progressively introduced to terminate the planarization of the wafer surface. As noted above, the method described in Hall requires the use of a slurry with an abrasive component and an alkaline chemical component. The polishing slurry is followed by a rinse with deionized

water (col. 2, lines 18-22) to lower the pH (col. 2, line 5). It is generally known, as noted, that deionized water has a pH of about 6 (Col 1, line 55-64). There is no motivation in Hall to use the surfactant of Nagoshi or *vice versa*. Thus, Nagoshi does not remedy the deficiencies of Hall so that this rejection is overcome and should be withdrawn.

Accordingly, as all rejections have been overcome, it is believed that the entire application is now in condition for allowance, early notice of which would be appreciated. In the event that the Examiner does not agree that all claims are now allowable, a personal or telephonic interview is respectfully requested to discuss any remaining issues in an effort to expedite the eventual allowance of this application.

Respectfully submitted,

Date: 11/16/04

Allan A. Fanucci (Reg. No. 30,256)

WINSTON & STRAWN LLP
CUSTOMER NO. 28765
(212) 294-3311

NY:910236.1